

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: Daniel Hart
Knobbe Martens Olson & Bear LLP
2040 Main Street, 14th Floor
Irvine, California 92614

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

17 AUG 2007

Applicant's or agent's file reference

DEXCOM.027QP

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/US 06/34284

International filing date
(day/month/year)

01 September 2006 (01.09.2006)

Applicant **Dexcom, Inc.**

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest against payment of (an) additional fee(s) under Rule 40.2**, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Mailposak: 571-272-4300
PCT DSP: 571-272-7714

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DEXCOM.027QP	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 06/34284	International filing date (day/month/year) 01 September 2006 (01.09.2006)	(Earliest) Priority Date (day/month/year) 09 March 2006 (09.03.2006)
Applicant Dexcom, Inc.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II)

3. ☐ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 17A
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/34284

A. CLASSIFICATION OF SUBJECT MATTER

IPC8 A61B 5/00 (2007.01)

USPC 600/345

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8 A61B 5/00 (2007.01)

USPC 600/345

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
A61B5/145 (2007.01)

USPC 600/300, 301, 309, 316, 319, 347, 365

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (PGPB,USPT,EPAB,JPAB)

Search terms: sensor, analyte, diabetes, glucose, smbg, noise, reference, outlier, smooth, filter, regression, average, response, rate, change, differential

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0043598 A1 (GOODE et al) 24 February 2005 (24.02.2005) entire document, especially para [0273] - [0368]	1 - 51

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

20 April 2007 (20.04.2007)

Date of mailing of the international search report

17 AUG 2007

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: Daniel Hart
Knobbe Martens Olson & Bear LLP
2040 Main Street, 14th Floor
Irvine, California 92614

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

17 AUG 2007

Applicant's or agent's file reference
DEXCOM.027QP

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 06/34284

International filing date (day/month/year)

01 September 2006 (01.09.2006)

Priority date (day/month/year)

09 March 2006 (09.03.2006)

International Patent Classification (IPC) or both national classification and IPC

IPC(B) - A61B 5/00 (2007.01)

USPC - 600/345

Applicant **Dexcom, Inc.**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Date of completion of this opinion

20 April 2007 (20.04.2007)

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OBP: 571-272-1774

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 06/34284

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

- a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

- b. format of material

- ☐ on paper
☐ in electronic form

- c. time of filing/furnishing

- ☐ contained in the international application as filed
☐ filed together with the international application in electronic form
☐ furnished subsequently to this Authority for the purposes of search

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 06/34284

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	2,6-9,11,13,17-20,22,25,26,28,30,31,34-37,39,40,43-46,48 & 51	YES
	Claims	1,3-5,10,12,14-16,21,23,24,27,29,32,33,38,41,42,47,49 & 50	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-51	NO
Industrial applicability (IA)	Claims	1-51	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1, 3-5, 10, 12, 14-16, 21, 23, 24, 27, 29, 32, 33, 38, 41, 42, 47, 49 and 50 lack novelty under PCT Article 33(2) as being anticipated by US 2005/0043598 A1 to Goode et al (hereinafter "Goode").

Regarding claims 1 and 12, Goode discloses method and system for analyzing data from an analyte sensor, comprising:

- a) receiving sensor data from the analyte sensor (para [0274]);
- b) the sensor data comprising at least two sensor data points (para [0304]); and
- c) calculating a rate of change of the sensor data from the sensor data points (para [0321]).

Regarding claims 3 and 14, Goode discloses the step of smoothing the sensor data points, wherein the step of smoothing is conducted prior to the step of calculating the rate of change (para [0274]).

Regarding claims 4 and 15, Goode discloses the step of smoothing being conducted using at least one of a moving average window, a regression, a finite impulse response filter, and an infinite impulse response filter (para [0328]).

Regarding claims 5 and 16, Goode discloses the step of calibrating the sensor data, wherein the step of calculating the rate of change is performed on non-calibrated sensor data (para [0311]).

Regarding claims 10 and 21, Goode discloses the step of determining if the rate of change is above a predetermined threshold or below a predetermined threshold (para [0324]).

Regarding claim 23, Goode discloses a system for analyzing data from an analyte sensor, the system comprising:

- e) a data receiving module configured to receive sensor data from the analyte sensor (para [0274]);
- b) the sensor data comprising at least two sensor data points (para [0304]); and
- c) a processor module configured to calculate a rate of change of the sensor data from the sensor data points substantially without artifacts caused by noise in the sensor data (para [0327]).

Regarding claim 24, Goode discloses the processor module being configured to smooth the sensor data points to accomplish calculation of a rate of change of the sensor data from the sensor data points substantially without artifacts caused by noise in the sensor data (para [0328]).

Regarding claim 27, Goode discloses that the processor module is configured to detect noise in the sensor data (para [0358]).

Regarding claims 29 and 38, Goode discloses a method and system for analyzing data from an analyte sensor, the method comprising:

- a) receiving data from the analyte sensor, the data comprising at least one sensor data point (para [0274]);
- b) receiving reference data from a reference analyte monitor, the reference data comprising at least one reference data point (para [0305]); and
- c) determining an acceptability of the sensor data or the reference data by subjecting the reference data and substantially time-corresponding sensor data to a boundary test utilizing boundaries (para [0306]).

Regarding claims 32 and 41, Goode discloses the step of determining acceptability of the reference data, wherein a positive determination of acceptability is determined when the reference data and substantially time-corresponding sensor data fall within the boundaries of the boundary test (para [0306]).

Regarding claims 33 and 42, Goode discloses using the reference data for calibration of the analyte sensor in response to a positive determination of acceptability (para [0307] and [0311]).

— See continuation sheet —

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations:

Regarding claim 47, Goode discloses a system for analyzing data from an analyte sensor, the system comprising:

- a) a sensor data receiving module configured to receive sensor data from the analyte sensor, the sensor data comprising at least one sensor data point (para [0274]);
- b) a reference data receiving module configured to receive reference data from a reference analyte monitor, the reference data comprising at least one reference data point (para [0305]); and
- c) a processor module configured to perform outlier detection on the reference data or the sensor data, wherein the processor module is further configured to calibrate the analyte sensor (para [0339] and [0311]).

Regarding claim 49, Goode discloses comparing reference data and time-corresponding sensor data to a boundary test (para [0339]).

Regarding claim 50, Goode discloses that the processor module is configured to detect noise in the sensor signal (para [0358]).

Claims 2, 6-9, 11, 13, 17-20, 22, 25, 26, 28, 30, 31, 34-37, 39, 40, 43-46, 48 and 51 lack an inventive step under PCT Article 33(3) as being obvious over Goode.

Regarding claims 2 and 13, Goode teaches the claimed invention but does not specifically teach the step of calculating a rate of change comprising calculating a rate of change of the sensor data from at least three sensor data points. Goode teaches the use of a data stream comprising one or more data points (para [0304]) and it would have been obvious to use at least three data points as this would improve the accuracy of any calculation.

Regarding claims 6 and 17, Goode teaches the claimed invention but does not specifically teach determining when at least three sensor data points increase continuously or decrease continuously, wherein the step of calculating the rate of change is performed only when at least three sensor data points increase continuously or decrease continuously. Goode does teach a process of continuous signal estimation in order to take signal artifacts into account in determining consistent detection has been ascertained. It would have been obvious to one skilled in the art that Goode could be modified in order to achieve this through determining the rate of change over three sensor data points as this would be a very efficient process.

Regarding claims 7 and 18, Goode teaches the claimed invention but does not specifically teach the step of calculating a rate of change value for at least two pairs of sensor data points. Goode teaches the use of pairs of data points (para [0307]) and it would have been obvious to one skilled in the art that Goode could be modified to calculate the rate of change over two or more pairs of data to achieve a more accurate result.

Regarding claims 8 and 19, Goode as modified above teaches the claimed invention and further teaches the step of smoothing the rate of change value (para [0274]).

Regarding claims 9 and 20, Goode as modified above teaches the claimed invention and further teaches the step of smoothing the rate of change value comprising utilizing at least one of a moving average window, a regression, a finite impulse response filter, and an infinite impulse response filter (para [0328]).

Regarding claims 11 and 22, Goode does not specifically teach the predetermined threshold being a positive 2 mg/dL/min or a negative 2 mg/dL/min. However, Goode does teach a threshold of about 4 to 5 mg/dL/min. It would have been obvious to one skilled in the art would contemplate a threshold of 2 mg/dL/min to provide more delicate monitoring.

Regarding claim 25, Goode teaches the claimed invention but does not specifically teach the processor module being configured to calculate a rate of change value for at least two pairs of sensor data points. However, Goode teaches the use of pairs of data points (para [0307]) and it would have been obvious to one skilled in the art that Goode could be modified to calculate the rate of change over two or more pairs of data to achieve a more accurate result.

Regarding claim 26, Goode as modified above teaches the claimed invention and further teaches that the processor module is further configured to smooth the rate of change value (para [0274]).

Regarding claim 29, Goode as modified above teaches the claimed invention but does not specifically teach that the processor module is configured to calculate the rate of change dependent at least in part upon whether the noise is detected. Goode does teach the detection of noise (para [0358]) and it would have been obvious to one skilled in the art that it would be beneficial to only calculate the rate of change when the signal is free of noise and that Goode could easily be modified to achieve this.

Regarding claims 30 and 39, Goode teaches the claimed invention but does not specifically teach that the boundaries are derived from prior information. The boundaries (para [0306]) appear to be based on experience and it would have been obvious to one skilled in the art that prior information would be the most effective way of setting the boundaries.

Regarding claims 31 and 40, Goode as modified above teaches the invention but does not specifically teach that the prior information comprises information obtained from at least one of in vivo testing of at least one analyte sensor and in vivo use of at least one analyte sensor. However, a common way for calibrating sensors generally is to perform control tests prior to deployment and it would have been obvious to one skilled in the art that Goode could be modified to make use of this information in setting boundary conditions.

--- see continuation sheet ---

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 06/34284

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V 2 - Citations and explanations:

Regarding claims 34 and 43, Goode teaches the claimed invention but does not specifically teach requesting additional reference data in response to a negative determination of acceptability. However, it would have been obvious to one skilled in the art that Goode could be modified to request further data should it fall outside the said boundaries as otherwise there would be no data to analyse.

Regarding claims 35 and 44, Goode as modified above teaches the claimed invention and further teaches determining acceptability of the additional reference data, wherein a positive determination of acceptability is determined when the additional reference data and substantially time-corresponding sensor data fall within the boundaries of the boundary test.

Regarding claims 36 and 45, Goode as modified above teaches the claimed invention and further teaches using the additional reference data for calibration of the analyte sensor in response to a positive determination of acceptability of the additional reference data (para [0307] and [0311]).

Regarding claims 37 and 46, Goode as modified above teaches the claimed invention and further teaches using the reference data for calibration of the analyte sensor if the additional reference data substantially corresponds to the reference data (para [0307], matched data pairs).

Regarding claim 48 and 51, Goode teaches the claimed invention but does not specifically teach that the processor module is configured to calibrate the analyte sensor after the system has successfully passed outlier detection or when noise is substantially not detected in the sensor signal. However, it would be obvious to one skilled in the art that it would be beneficial to only calibrate the sensor after erroneous data has been removed and that Goode could be simply modified to perform this.

Claims 1-51 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.